

US Pixel Module Activities

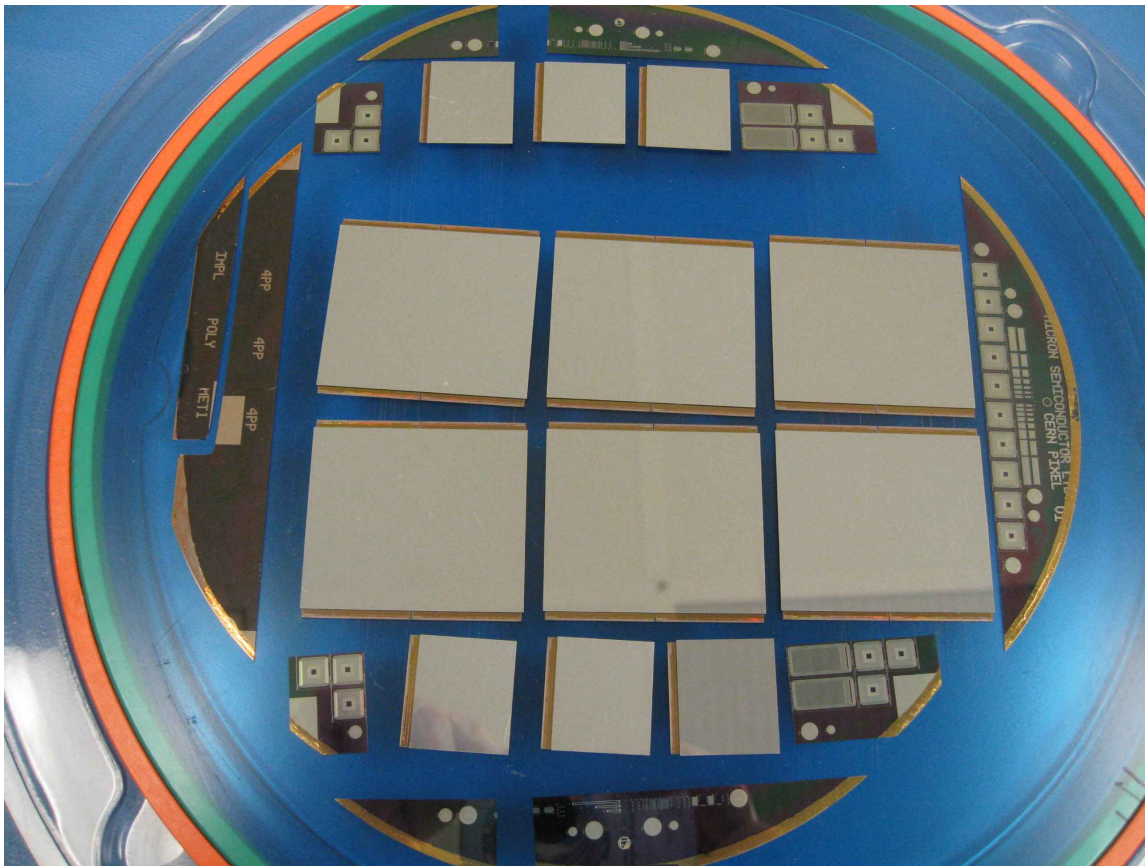
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Argonne National Laboratory

- Modules with RTI bump-bonding
- Cable production
- Dummy module
- FE 65nm chip

- The US (SLAC/UCSC) is validating RTI--a bump-bonding vendor in the US for pixel module production
- Successfully completed nearly identical work for other projects
- 3 FEI4b wafers (LBNL)
- 2 sensor wafers from Micron (Liverpool and UCSC)
- 50 μm x 50 μm pitch
- production will include
 - 12 single chip modules
 - 12 quad modules
- First modules were received end of April
 - issues were found
- Expect reworked modules end of May

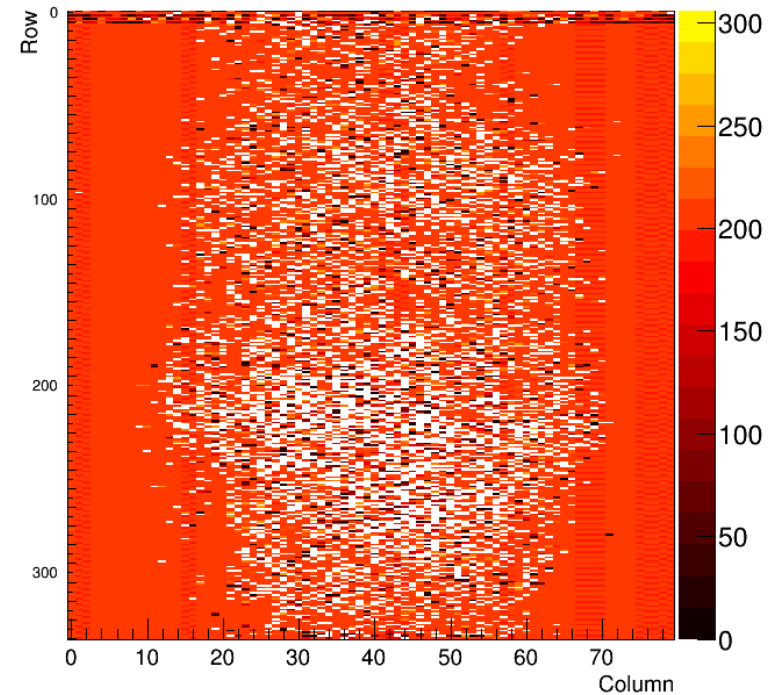
RTI modules arrived at SLAC
6 quads + 6 singles

From Chris Kenney, 4 single chip sensors:



- 3 single chip modules were loaded at LBNL
- Analog injection test indicates lots of shorted pixels
 - All 3 modules look qualitatively the same

Occupancy mod 0 bin 0 chip 0



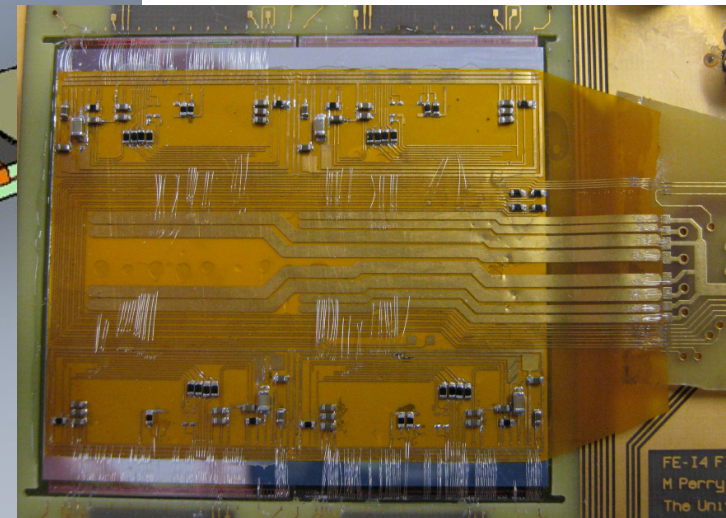
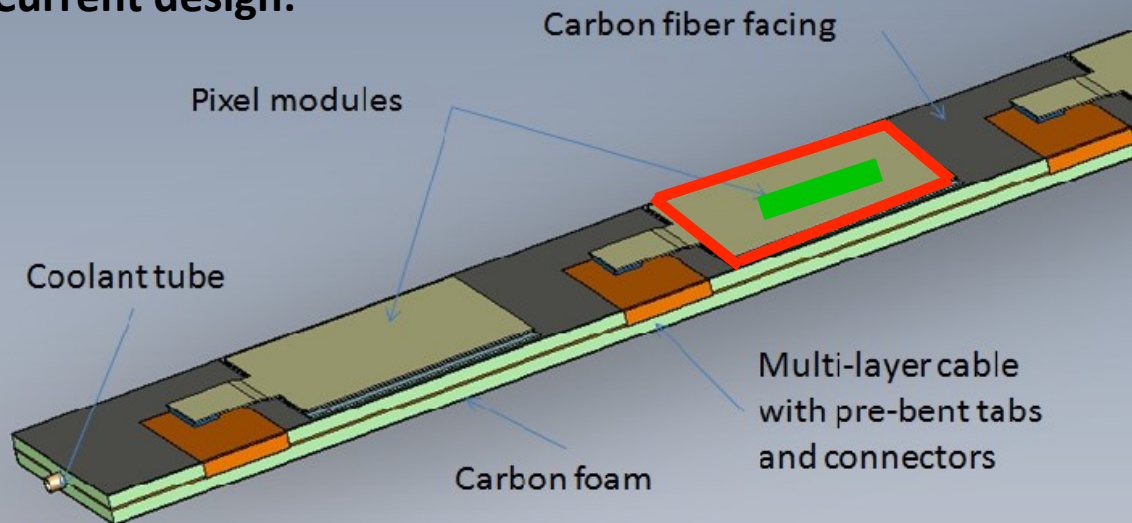
- Several single-chip modules returned to RTI
- RTI is investigating the cause of the shorts
- Initially suspected an improperly performed plasma cleaning step
- After disassembling one module, it became apparent that the bumps are actually merged
- RTI has not had this occur before on SLAC projects or with other customers
- Attempting to reprocess the sensor wafer to decrease the effective bump diameter
- Should receive reworked parts back this month.

Quad Module Flex Redesign

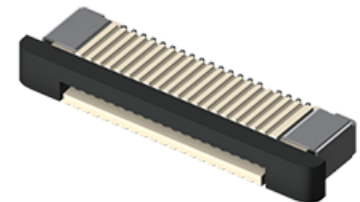
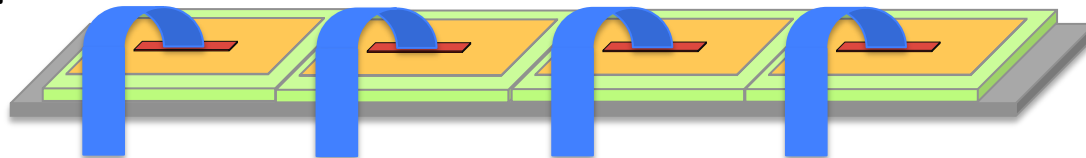
Argonne redesign the quad module flex cable:

- Add a connector on the quad module flex cable to allow modules to be placed adjacent to each other

Current design:



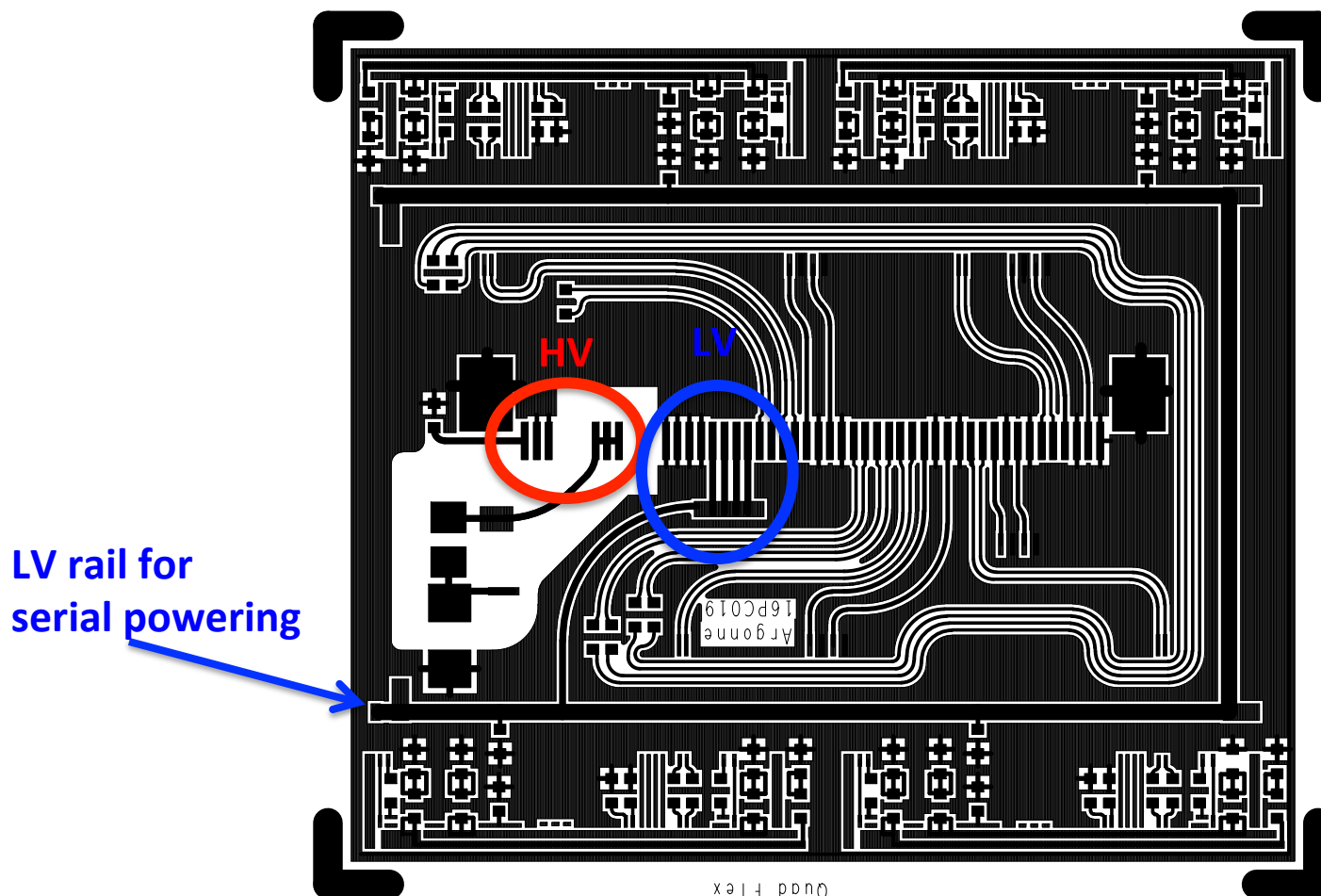
Updated concept:



ZIF connector

Quad Flex Cable

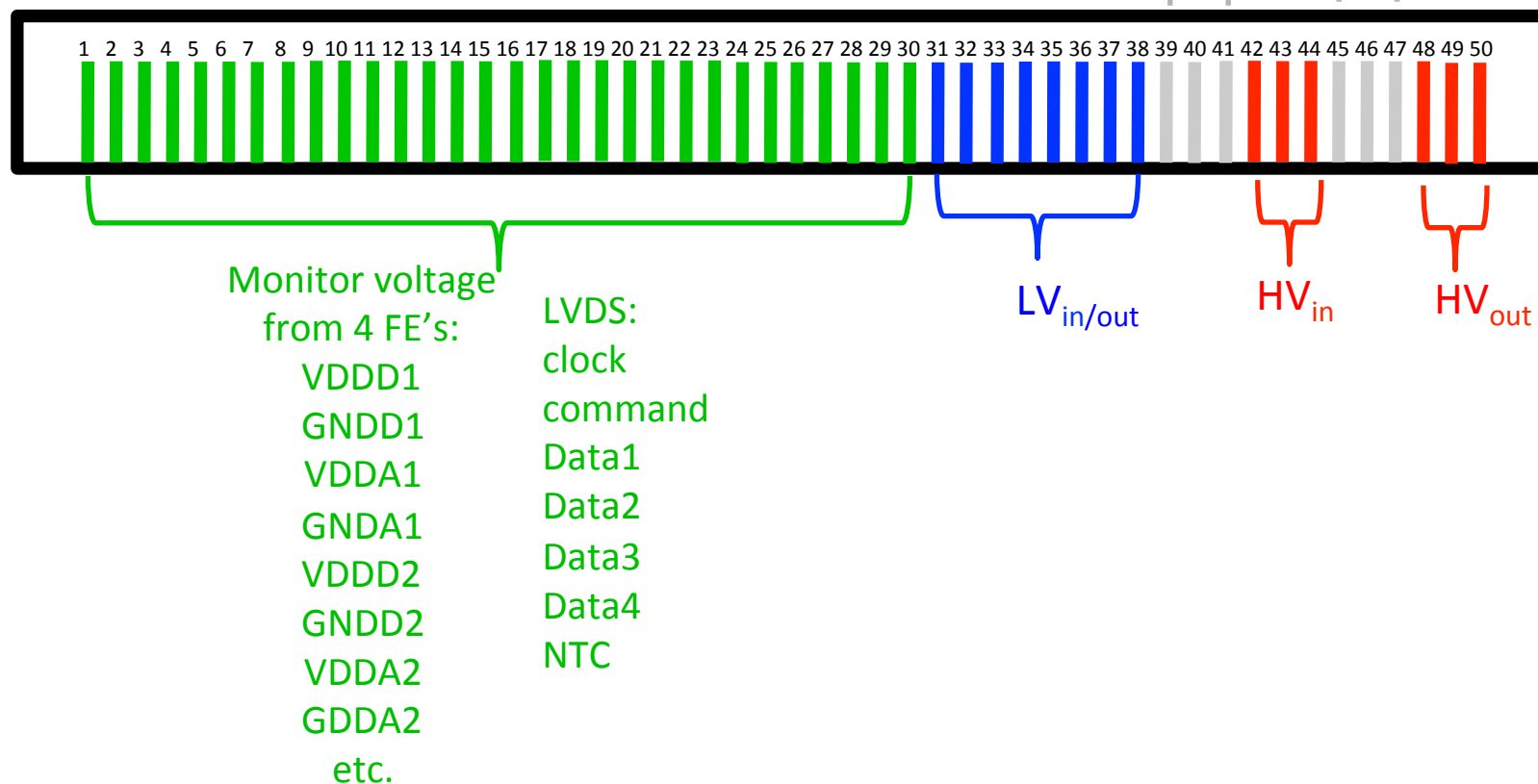
- Redesign finished, checked off by original designer, Ilya Tsurin (Liverpool)
- Ordered 30 cables for test production
 - Ready to distribute in ~3 weeks
 - Plan to order ~100 more depending on demand



Quad Flex Pin-out

Current Layout:

Remove
3 pins = 1.5 mm



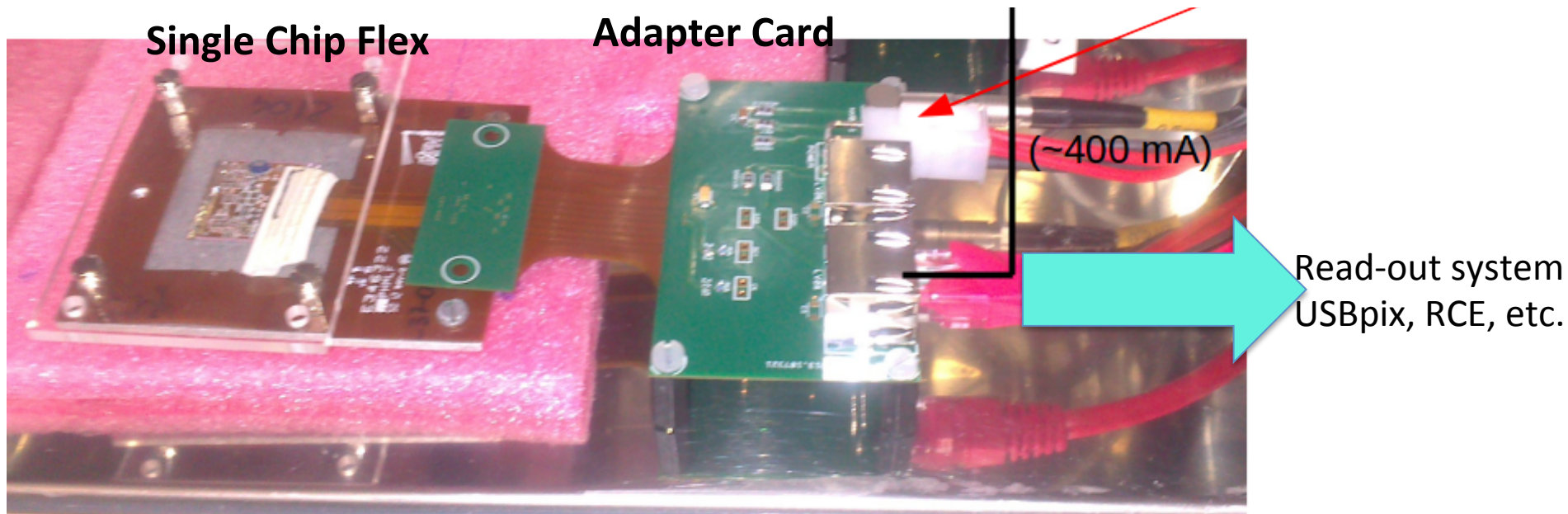
Quad Flex Pin-out

Pin-out:	Pin		Pin	
	1	GNDA3	26	VDDD4
	2	VDDA3	27	Data4+
	3	GNDD3	28	Data4-
	4	VDDD3	29	NTC-
	5	Data3+	30	NTC+
	6	Data3-	31	LV_IN
	7	GNDA2	32	LV_IN
	8	VDDA2	33	LV_IN
	9	GNDD2	34	LV_IN
	10	VDDD2	35	LV_OUT
	11	Data2-	36	LV_OUT
	12	Data2+	37	LV_OUT
	13	GNDA1	38	LV_OUT
	14	VDDA1	39	-
	15	GNDD1	40	-
	16	VDDD1	41	-
	17	Data1-	42	HV_IN
	18	Data1+	43	HV_IN
	19	Command-	44	HV_IN
	20	Command+	45	-
	21	Clock-	46	-
	22	Clock+	47	-
	23	GNDA4	48	HV_OUT
	24	VDDA4	49	HV_OUT
	25	GNDD4	50	HV_OUT

Single chip flex

Single chip flexes are being produced by UCSC

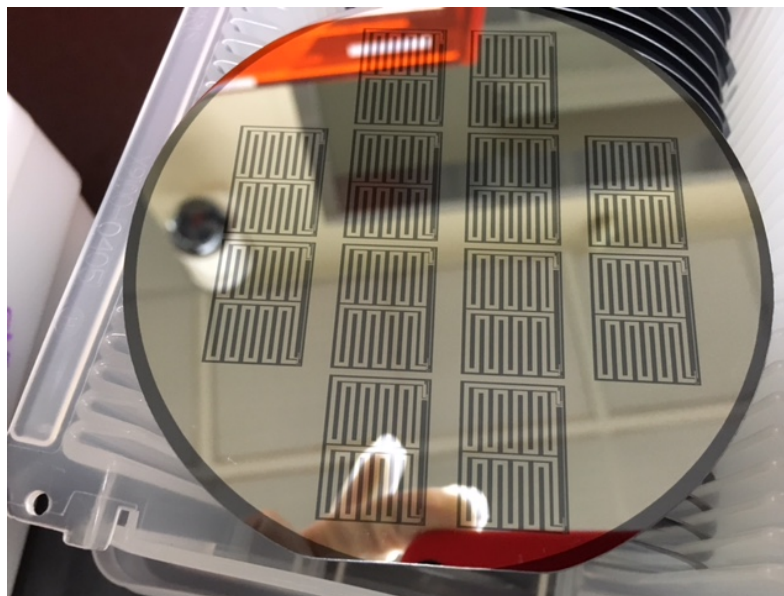
- Order ready to go out in the next few days
- 10 days for fabrication and stuffing
- Still need adapter card



Dummy Modules

Summarized from Chris Kenney:

- Mechanical dimensions similar to FE65
- Dummy sensor wafers provided by LBNL
- Dummy ASIC wafers had metal deposited, lithography, and etching by Julie Segal (SLAC)
- 72/75 wafers were successful
- Will be able to wire bond to dummy modules
- Resistors on 'FE' are able to generate local heat
- 'snake' resistance is about 20 Ω for oxide wafers, 30 Ω non-oxide wafers (8 Ω target)
- Expect to complete end of June



- SLAC is bump-bonding FE65p modules
- LBNL supplied a set of FE65p IC chips
- KEK supplied a set of sensor chips from Hamamatsu
- UBM and bumps deposited (SLAC)
- First 4 modules have been flip-chip bonded
 - Expect about 10+ total

More US module related activities??

- Please report in ~bi-weekly module meetings on Thursdays at 2 pm PT

Plans:

- Procure adapter cards for both flex designs
- Layout path for US effort moving toward the Pixel TDR

Backup